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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/671,773 | 09/29/2003 | Hung-Yu Chiu | 0941-0848P | 7558 |
| 2292 | 7590 | 10/31/2005 | EXAMINER | |
| BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747 | | | TOLEDO, FERNANDO L | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2823 | |

DATE MAILED: 10/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

EX

| | | |
|------------------------------|------------------------|---------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/671,773 | CHIU ET AL. |
| | Examiner | Art Unit |
| | Fernando L. Toledo | 2823 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 15 August 2005.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) 12-22 is/are allowed.
- 6) Claim(s) 1-11 and 24 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 29 September 2003 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. 10/242,773.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1, 7, 8, 11 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bacchetta et al. (U. S. patent 5,627,403 A) in view of Wu (U. S. Patent 6,689,658 B2).

In re claim 1, Bacchetta, in the U. S. patent 5,627,403; figures 1 and 2 and related text discloses, providing several interconnect structures (7) forming a passivation structure (2,3) over the several interconnect structures (7) wherein the passivation structure includes a first dielectric layer 2 and a silicon-oxy-nitride (SiO_xN_y) layer (3); and forming a second dielectric layer 5 over the surface of the passivation structure (Figure 2).

Bacchetta discloses wherein the interconnect structures are of a conductive material. However, Bacchetta does not specifically teach whether the interconnect structures are made of metal. Furthermore, Bacchetta does not disclose forming a substantially planarized inter-layer dielectric layer covering several metal interconnect structure.

Wu, in the U. S. Patent 6,689,658 B2 discloses a method of forming a flash memory device which discloses that the interconnect structures can be form of conductive materials such as metal (Column 5, Lines 45 – 50) and forming a substantially planarized inter-layer dielectric layer covering several metal interconnect structure (Figure 2C).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the interconnect structures of Bacchetta out of metal, since, as taught by Wu, the interconnect structures of a flash memory device can be formed out of metal.

Art Unit: 2823

3. In re claim 8, Bacchetta discloses, wherein the memory device is a flash memory device (Column 5, Lines 7 – 10).

4. In re claim 11, Bacchetta discloses, wherein at least one of the first dielectric layer, the silicon-oxy-nitride (SiO_xN_y) layer, or the second dielectric layer comprises substantially planarized surface (Figure 2).

5. Bacchetta discloses wherein the SiO_xN_y layer is about 12,000 Å thick.

Bacchetta in view of Wu does not disclose wherein the SiO_xN_y is from between 4,000 to 7,000 Å thick.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the SiO_xN_y thickness to be between 4,000 to 7,000 Å, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. In addition, the selection of thickness, it's obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are *prima facie* obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996) (claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and *In re Aller*, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious). Note that the specification contains no disclosure

of either the critical nature of the claimed thicknesses or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen thicknesses or upon another variable recited in a claim, the Applicant must show that the chosen thicknesses are critical. *In re Woodruf*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

6. In re claim 24, Wu discloses wherein the substantially planarized inter-layer dielectric layer is made of hydrogen blocking material (Column 12, Lines 25 – 35).

7. Claims 2, 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bacchetta in view of Wu as applied to claims 1, 7, 8 and 11 above, and further in view of Higashitani et al. (U. S. patent 6,346,737 B1).

In re claim 2, Bacchetta discloses forming the oxide film by PECVD.

Bacchetta in view of Wu does not disclose forming the oxide film by HDPCVD.

However, Higashitani, in the U. S. patent 6,346,737 B1; figures 1 – 2g and related text, discloses, that HDPCVD is a self-planarization process, that reduces the CMP times required in subsequent steps (Column 5, Lines 41 – 43).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the oxide layer of Bacchetta in view of Wu by HDPCVD, since as taught by Higashitani, HDPCVD is a self-planarization process, that reduces the CMP times required in subsequent steps.

8. In re claims 3 and 10, Bacchetta discloses wherein the first dielectric layer is 2,100 Å thick.

Bacchetta in view of Wu and in further view Higashitani does not disclose wherein the thickness of the first dielectric layer is between 7,000 Å and 10,000 Å.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the first dielectric layer thickness to be between 7,000 to 10,000 Å, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. In addition, the selection of thickness, it's obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are *prima facie* obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and *In re Aller*, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious). Note that the specification contains no disclosure of either the critical nature of the claimed thicknesses or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen thicknesses or upon another variable recited in a claim, the Applicant must show that the chosen thicknesses are critical. *In re Woodruf*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

9. Claims 4 – 6 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bacchetta as applied to claims 1, 7, 8 and 11 above, and further in view of Wolf and Tauber (Silicon Processing for the VLSI Era Volume 1: Process Technology).

In re claim 4, Bacchetta discloses forming the PSG layer with a CVD process (Column 5, Line 67).

Bacchetta in view of Wu does not disclose forming the PSG layer by APCVD.

However, Wolf in the textbook Silicon Processing for the VLSI Era Volume 1: Process Technology discloses that APCVD processes are simple reactors, have fast deposition at low temperatures (Page 168, Table 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the PSG layer of Bacchetta by APCVD since as taught by Wolf, APCVD processes are simple reactors, have fast deposition at low temperatures.

10. In re claims 5 and 10, Bacchetta discloses wherein the second dielectric layer is 4,000 Å.

Bacchetta in view of Wu and in further view of Wolf does not show, wherein the second dielectric layer is between 8,000 Å to 10,000 Å.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the second dielectric layer thickness to be between 8,000 to 10,000 Å, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. In addition, the selection of thickness, it's obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are *prima facie* obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. *In re Woodruff*, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also *In re Huang*, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not

merely in degree from the results of the prior art). See also *In re Boesch*, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and *In re Aller*, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious). Note that the specification contains no disclosure of either the critical nature of the claimed thicknesses or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen thicknesses or upon another variable recited in a claim, the Applicant must show that the chosen thicknesses are critical. *In re Woodruf*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

11. In re claim 6, Bacchetta discloses wherein the SiO_xN_y layer is deposited.

Wolf discloses on page 161 that CVD processes are often selected over competing deposition techniques because they offer the following advantages: a) high purity; b) a great variety of chemical compositions can be deposited among others.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the SiO_xN_y layer of Bacchetta by CVD, since as taught by Wolf, CVD processes are often selected over competing deposition techniques because they offer the following advantages: a) high purity; b) a great variety of chemical compositions can be deposited among others.

12. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bacchetta as applied to claims 1, 7, 8 and 11 above, and further in view of Sung (U. S. patent 6,235,592 B1).

Bacchetta discloses that the device is a memory device, such as an EEPROM.

Bacchetta in view of Wu does not disclose that the memory device could be a mask ROM.

However, Sung, in the U. S. patent 6,235,592 B1; figures 1a – 3 and related text, discloses, that memory devices could be, among others EEPROM, PROM and mask ROM (Column 1, Lines 18 – 25).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to teach that the memory device of Bacchetta could be a mask ROM, since as taught by Sung, memory devices include but are not limited to EEPROM, PROM and mask ROM.

Allowable Subject Matter

13. Claims 12 – 22 are allowed over the prior art of record.

Response to Arguments

14. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fernando L. Toledo whose telephone number is 571-272-1867. The examiner can normally be reached on Mon-Thu 7am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2823

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



George Hourson
Primary Examiner
Art Unit 2823



FToledo
27 October 2005